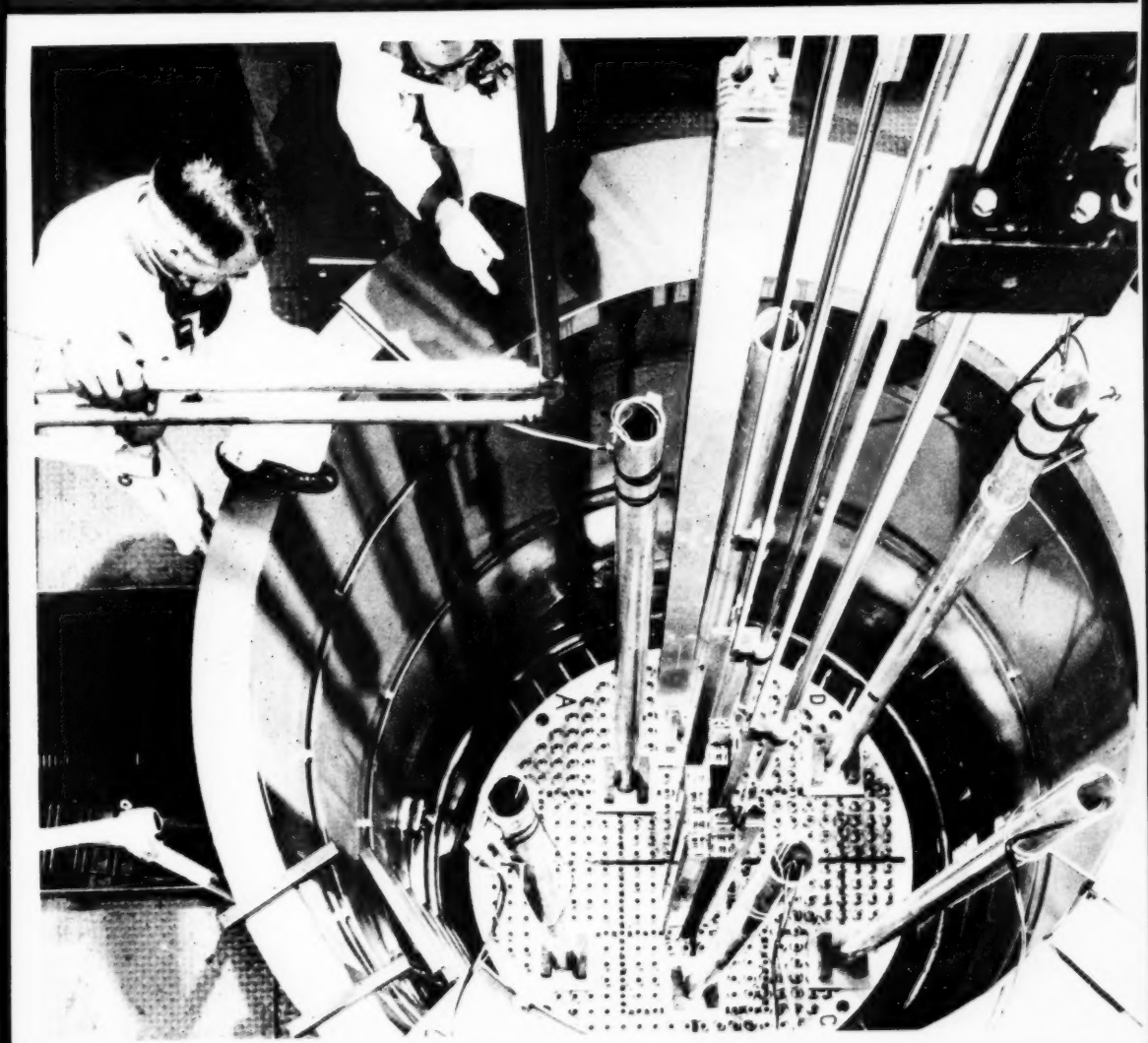
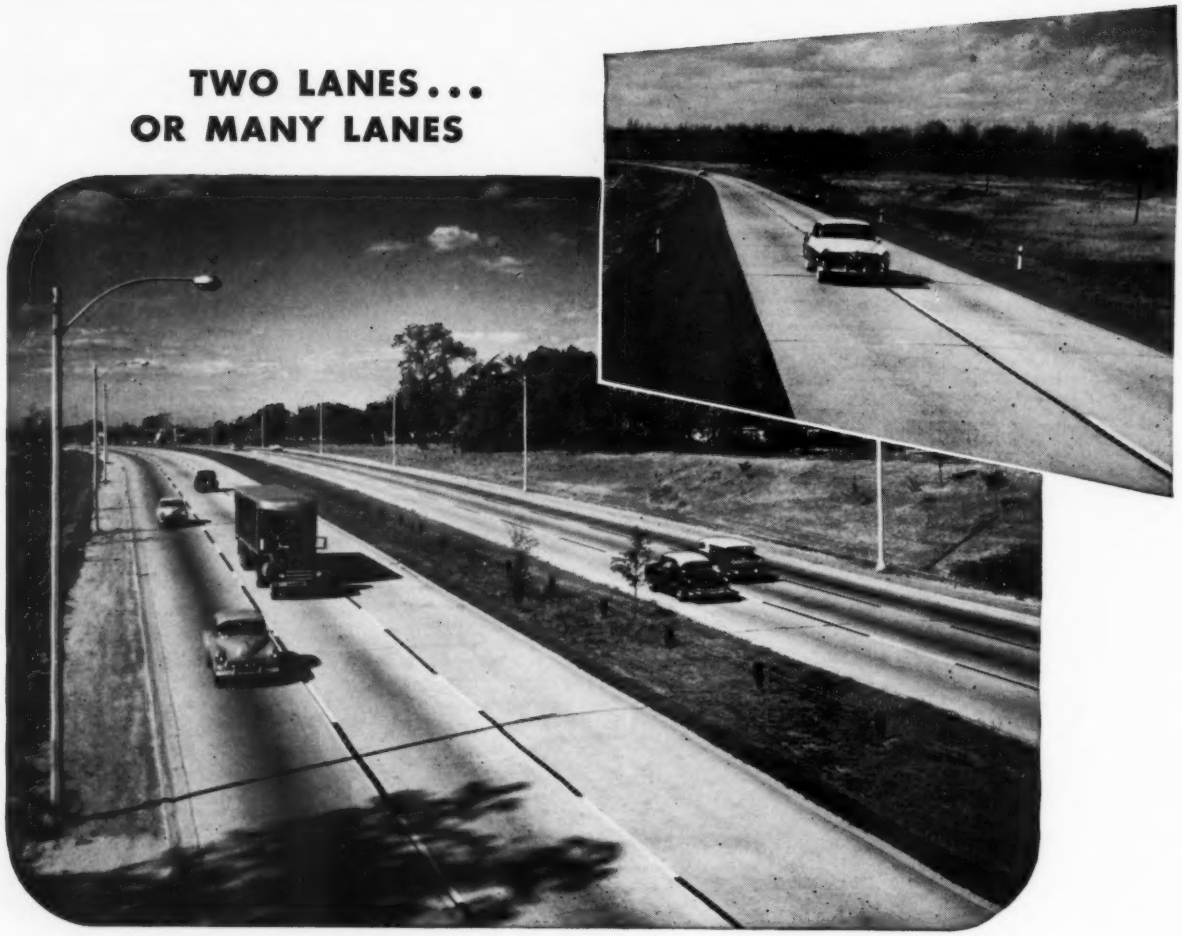
Midwest Engineer



WESTERN SOCIETY OF ENGINEERS
FOUNDED 1869

No. 2

TWO LANES...
OR MANY LANES



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AT
84 EAST RANDOLPH STREET
CHICAGO 1, ILLINOIS

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Single Copy ..... $ .50
Annual subscription 4.00
Foreign subscription 6.00

Entered as second-class matter at the post office at Chicago, Illinois under the Act of March 3, 1879.

Midwest Engineer

A Publication of the

WESTERN SOCIETY OF ENGINEERS

Serving the Engineering Profession

July, 1957 Vol. 10, No. 2

CONTENTS

COVER STORY

Looking down into tank of The Babcock & Wilcox Company's critical experiment reactor at Lynchburg, Va. Fuel elements comprising "core" stand on pins on round grid plate at bottom of tank. Neutron-absorbing rods, used to control chain reaction of assembled core, are in position among fuel elements. Long tubes extending from grid plate contain various instruments for test and control. Tank is filled with water when reactor is operating.

YOUNG ENGINEERS FORUM

The eighth Young Engineers Forum of Western Society of Engineers will start October 17, 1957 and continue for five consecutive Thursdays. The Forum is designed to provide the young engineer with an opportunity to meet and confer with other young engineers and mature engineers who have become established in the profession. The Forum also gives young engineers the opportunity to broaden their understanding of engineering in its relation to the important business of the community.

The social hour will be from 5:30 to 6:30 P.M., the dinner from 6:30 to 7:30 and the speaking and discussion period will close promptly at 9:00 P.M.

Many attending the Forum are sponsored by the companies employing them. However, individual registrations will also be accepted at Western Society's office until the enrollment limit is reached. The fee is $25.00.

Because of the limit on the number of enrollments being accepted, you should register to take advantage of this opportunity at once.

The program this year will cover the following industries: Packaging and Containers—Aviation—Farm and Industrial Machinery—Steel Fabrication—Petroleum—Finance.

Beginning Tuesday, September 3, the Dining Room on the 5th floor of Western Society Headquarters will return to serving full-course luncheons and dinners. The Lounge facilities will again be located on the 6th floor.

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Keep the evening of October 1, 1957 open for

THE ANNUAL FALL DINNER

to be held at the Furniture Club of America
Speaker: James E. Day, President, Midwest Stock Exchange

Because of the Annual Fall Dinner being held October 1, there will be no General Monthly Meeting during the month of September.

Banking
and the
Federal-Aid Highway Program

by Fred F. Florence

It is indeed a privilege for me to address this important convention of the American Road Builders' Association. I have been impressed with the spirit of enthusiasm that prevails here, which doubtless stems in large measure from the great challenge that is facing the road-building industry today. As a banker, I am in daily contact with a broad representation of people from the business world and civic life of our country. This has enabled me to sense deeply the spirit of an America that is moving forward courageously and confidently toward a better way of life for all of our people. This spirit is being expressed in the great capital expansion programs of industry: in the advances of technology in chemicals, electronics, atomic energy, and in so many other lines that are calling upon the resources of our financial system to a degree never before experienced. As our population continues to increase, this spirit is being expressed in the broadening of our market for consumer goods which makes every-day living more pleasant and worthwhile. Indeed, this spirit is being expressed in the forward vision of leaders in all segments of our national life who recognize not only our great potentials for growth, but also the importance of the physical facilities required for realizing those potentialities.

It is my understanding that this is your first annual convention since passage of the Federal-Aid Highway Act last June. I welcome this opportunity, therefore, to commend your Association for its significant contribution in securing the enactment of this important legislation. You have demonstrated the forward vision which typifies the spirit of growth and betterment of America. Of this, you can be justly proud.

Mr. Florence, of the Republic National Bank, Dallas,, Texas, delivered this address at the American Road Builders Association's 55th Annual Convention in Chicago on January 29, 1957.

Program Well Conceived

The present highway program has been well conceived, and should be regarded as an essential step in further improving our domestic economy and in materially strengthening our national defense and security.

When your Chairman graciously invited me to talk to you at this Convention, I was delighted, because it affords me a fine occasion to discuss with an important segment of our business community the policies and attitudes of the banking industry in this period of dynamic growth.

Over the past year, and a little longer, you have heard a great deal about "tight money." The importance of the current credit picture has not been clear to many people, and therefore, it might be appropriate for me this morning to interpret the significance of banking policies for users of credit, of which you directly and indirectly are an interested group.

The Program Concept

First of all, may I state that the concept of the new highway program conforms to the basic political philosophy which is inherent in our historical approach to money and banking matters. The concept is that of having the Federal Government and State and local governments work side by side to serve a basic need of our nation. In banking we call it the dual system. It provides a team operation under which implementation and guidance by the Federal Government is combined with the vitality, initiative and resourcefulness of the local community or region. This facilitates planning, but avoids the dictation that one might find in a Government not rooted in our traditions of combined Federal and local authority.

Over the last century the dual concept of the banking system has been invaded to the extent that the national interest has increasingly required a closer supervision over our money and credit. Banking is at the nervecenter of the economy. It provides the money for the country. While we still have a dual system of banking—that is a network of some 14,000 local, national and state banks; yet we have superimposed upon them a monetary authority — the Federal Reserve System—whose function it is to influence the cost and to regulate the supply of money and credit flowing through the banking system and on out through all avenues of economic activity.

It is this regulation of the supply of money and credit which in recent months has given rise to the so-called "tight money" situation that is so much in the minds of businessmen, local governmental planning officials and various interested groups. In past periods, failure to provide adequate regulation of the supply of money and credit led to damaging economic instability; and it is just such damage that our Federal Reserve System is trying to avoid in the current situation.

A short time ago, Chairman Martin of the Federal Reserve Board stated at a hearing before the Congressional Joint Economic Committee that the task of the Federal Reserve System is to "determine the volume of credit that needs to be made available in order to keep the economy running in high gear, but without overstrain." He pointed out that "too much credit would intensify upward pressures on prices, and that too little could needlessly starve some activi-

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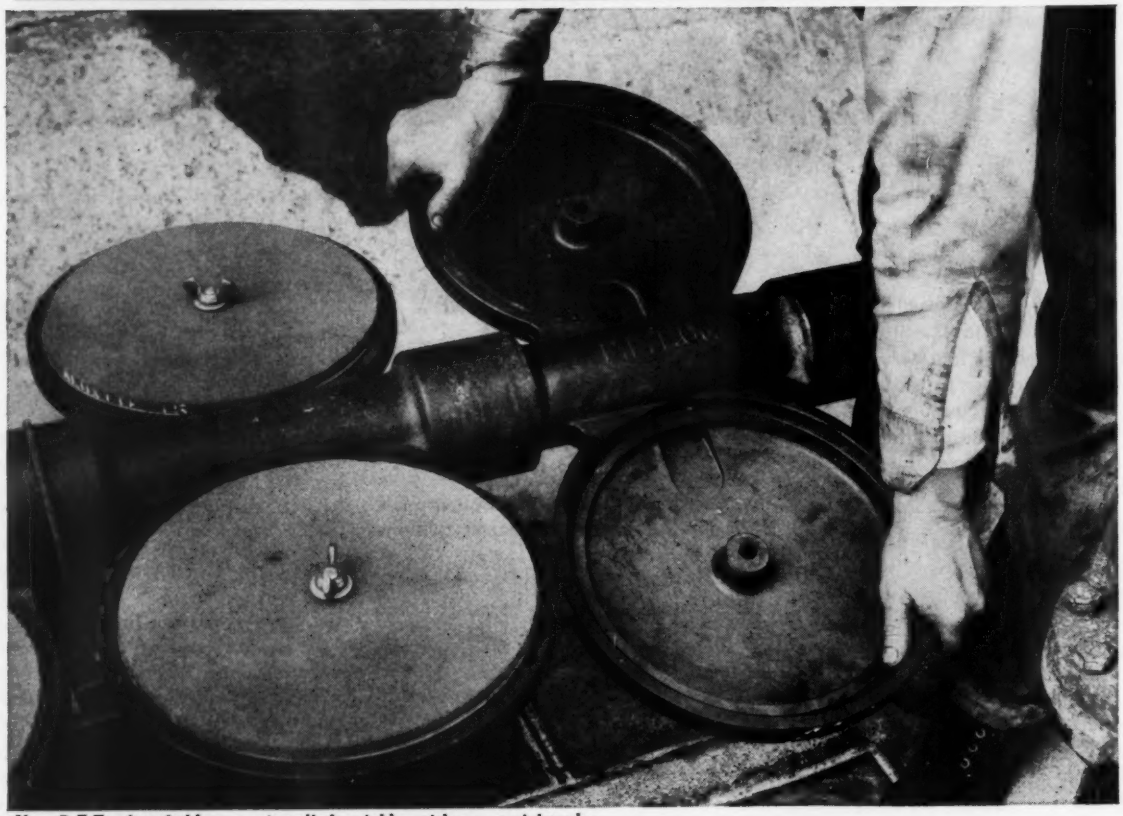

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ties"; stating "that experience has demonstrated that allocations of credit determined through the market processes are to be preferred to judgments-or-guesses-of public authorities, however well intentioned."

Established Federal Reserve policy seeks two objectives; namely, economic stability and economic growth.

We are fortunate that, in pursuing these essential objectives, our philosophy of credit regulation is in the democratic tradition. It is not Federal dictation from above as to who should be granted credit, and who should be denied credit. Rather, that philosophy embodies broad and impersonal use of general instructions of monetary policy which exercise such restraint as would avoid further inflation while disrupting the normal processes of our free economy as little as possible. This kind of philosophy provides the grantors of credit—the banks and other lenders—broad freedom, under traditional standards of safety, to allocate the available supply of credit as they deem appropriate. The market place determines who is to receive credit, and how much. It is not determined by a commissar of finance.

Tight Money

What, then, is the meaning of "tight money," and what are its implications for those who are so much interested in its effects upon our very important highway programs? Also, what part do banks play in the picture?

First, it should be taken into consideration that other financial institutions and sources outside of banking, such as insurance companies, trust funds, savings and loan associations, pension funds, and even the Federal Government, constitute a significant influence in supplying credit in our country.

In simple terms, in its relation to banks, as long as inflationary forces continue to press heavily upon our economy, the Federal Reserve authorities have deemed it essential to restrain an excessive expansion of credit which would add purchasing power to the economy, and thus increase competition for labor and materials that are already scarce in key sectors. The banking system is the medium through which this credit restraint is exercised, and the Federal Reserve System, through the market mechanism, has held down the creation of new bank reserves which make possible the expansion of bank credit. or our supply of money.

Supply and Demand

There are two sides to every market: supply and demand. The relationship between them is expressed in prices. In credit markets, the price which eventually balances supply with demand is the interest rate. The situation recently has been one in which demand for capital and credit is unprecedented. The dynamic forces of growth have taxed the resources of our financial institutions to an extent never before experienced, and therefore, interest rates have risen sharply.

We are undertaking to build industrial plants and other productive facilities, homes, shopping centers, commercial buildings, schools, public areas, and other civic improvements. This includes roads. We are seeking to maintain and extend our standards of personal consumption with the conveniences of modern living. This includes more and larger automobiles to use the roads. We are attempting to enlarge our supplies of essential materials and smooth their flow through productive channels. This includes structural steel and cement. We are looking toward enlargement of aid to our friends abroad in areas torn by the forces of Communism. And we are budgeting our national security expenditures alone at the staggering cost of over $43-billion in the next fiscal year.

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All of these prospective demands combine to produce a tremendous pressure directly and indirectly on the available supply of money and credit. There are just not enough accumulated savings that can be apportioned among users of credit to accomplish all we are trying to do. The alternative would be to create a greater supply of credit in the form of money. That, as previously indicated, is an inflationary course, and it must be avoided if we are to have assurance of stability and continued growth in the long run.

Part of the answer to credit inflation and instability is credit restraint. Yet, "tight money"—or credit restraint—is not an end unto itself. It merely reflects a situation in which the forces of demand for funds in credit markets are being matched against a supply that is permitted to expand only as rapidly as can be justified by constructive use of the available production facilities, and also supplies of manpower and materials. "Tight money"—I want to emphasize—in no sense means that credit is not available. It *does* mean that those who seek it must be willing to compete for it in the markets through the pricing mechanism of the interest rate, and it does mean that lenders must exercise a greater degree of selectivity in allocating their available funds among borrowers. In times like these, borrowers, as well as lenders, have a responsibility to carefully consider the essentiality of purposes for which credit is to be used, not only because of its effect upon their own affairs, but also because of its effect upon the general welfare of our people and the entire country.

In relation to banking and the highway program, may I quote from the resolution of the Annual Convention of The American Bankers Association last October, at which time it was my privilege and honor to serve as President of the Association:

"Banks have the important responsibility of seeing that credit is used for constructive purposes that help to preserve stability and make for further growth on a sound basis. Within the framework of current Federal Reserve Policy, banks must help to balance the forces of demand for credit against a supply which can accommodate the sound requirements of an economy that sometimes tries to do too much in too short a period."

It is my firm conviction—and this reflects the basic philosophy of the banking industry as expressed in the resolution—that one of the soundest contributions we can make to the highway program is a determination to assist in the preservation of our nation's overall economic stability as a sound base for growth.

For a long time, credit was abnormally cheap because demands never quite matched a supply that was permitted to grow rapidly, but at a price and in a manner that contributed to inflation. It used to be relatively simple to obtain funds for a project, once authorization was obtained from legislative authorities.

Today, however, funds for the construction of highways—like all other demands for credit, even that needed by the Federal Government—must meet a more rigid test of the market. This ob-

(Continued on Page 18)

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Magnesium and the Nike-Cajun Sounding Rocket

Early this fall, University of Michigan scientists will begin launching the Nike-Cajun high-altitude rocket as part of a series of tests aimed at probing the upper atmosphere for important weather and pre-travel information. The studies will reflect many months of preparation during which jet propulsion, electronics and light metals were blended into a sleek, high-flying data-gatherer capable of soaring 100 miles above the earth. Adding significantly to the height the Nike-Cajun can attain are the magnesium fins that guide the missiles in their sky-probing flights, magnesium couplings that keep the two-stage rocket together during the initial phase of firing, and magnesium blast cap rings that trigger the rocket's electronic "brain" into the earth's upper air.

The over-all Nike-Cajun operation, sponsored by the National Science Foundation and the Armed Forces laboratories, involves several universities and the firing of some 60 of the two-stage rockets from U. S. launching sites at Guam, and Fort Churchill, the latter is located in Canada on Hudson Bay. Planned as part of the U. S. contribution to the 70-Nation Geophysical Year (which began July 1), the rockets will be instrumented to measure water-vapor distribution, the earth's magnetic field, cloud structure, pressure, temperature, density, winds, charge density, cosmic rays and auroral particles in the upper atmosphere.

The studies are expected to reveal far more "about the weather" than has ever been previously known. Until rocket research made upper atmospheric study possible, man's knowledge about the causes of weather phenomena was restricted to what he was able to observe near the surface of the earth. Much has been learned in the past decade, but the forthcoming studies will be the biggest attempt yet made to probe the higher regions of the atmosphere. What is learned will contribute significantly to an understanding of such occurrences as tornadoes, hurricanes, electrical storms . . . and may eliminate the car wash as an indication of rain.

The studies, too, should reveal a good deal of the information needed before man can leave the confines of earth in space-traveling rockets. We are very near the point where manned rockets could be launched into outer space . . . but what happens to such a carrier soaring through the upper air at the tremendous speeds required to kick a space ship free of earth gravity on its way to the moon or Mars? And how does it get back? Huge meteors traveling at ultra-high speeds disintegrate completely when they hit the upper atmosphere. Disintegration would be the fate of a rocket returning from a space trip unless it has some means of checking its speed when it approaches earth. Scientists hope to obtain some answers to these problems through a better understanding of the relatively unexplored body of air surrounding our planet.

The University of Michigan will launch about one-fifth of the proposed rockets from the Fort Churchill site, with attention focused on upper atmospheric air pressure, density and temperature. Information from the upper atmosphere will be transmitted to earth-bound listening stations by measuring devices that will soar some 80 to 100 miles above the earth. Getting the instruments up there, of course, is the crux of the whole operation.

Rocket research has progressed considerably since the initial post-World War II firings of captured German V-2's. For example, the V-2's, 2,000 lb. payload (net weight of instrumentation carried) has given way to 100 . . . 50 and even 25 lb. "brains" as the evolution of tiny transistors, miniature but powerful transmitters, batteries and other components has helped eliminate unnecessary weight. Weight savings in the rockets themselves have been made possible through the use of light-weight, modern metals wherever possible. Magnesium is one of the metals which is figuring importantly in rocket design.

The Nike-Cajuns, for example, employ a unique fin and quadrant type assembly fabricated entirely of magnesium. The cone-shaped coupling which connects the Nike and the Cajun through the first stage of firing is a magnesium sand casting. So is the blast cap ring in the nose of the Cajun which triggers the spherical "brain" into the ionosphere.

According to Magline president, D. C. Law, whose firm is working with University of Michigan scientists on the Nike-Cajun program, "Much of the progress now being made in air-borne missiles can be attributed to the extensive research carried on by the magnesium and other light metal industries in successfully developing new alloys and advanced fabricating techniques.

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"Rockets, designed to reach into the upper atmosphere and beyond, must be able to withstand extremely high temperatures caused by aerodynamic heating. Weight problems are also a critical factor—every pound saved adds an extra 3,000 ft. to the altitude the Nike-Cajun rocket can attain. To meet these requirements, University of Michigan scientists turned to magnesium. Such properties as extreme lightness, high stiffness-to-weight ratio and magnesium's ability to withstand high temperatures, enable the air researchers to get what they want and still trim many pounds."

Expense, too, has been appreciably reduced. The Nike-Cajun vehicle costs about $6,000 to build, considerably less than liquid rockets of comparable performance. "This," says William H. Hansen, member of the University of Michigan research team, "is because the Nike-Cajun, from its magnesium booster fins to the conical nose cone, has been engineered to operate with maximum simplicity. Using an all-solid propellent, the Nike-Cajun has eliminated fueling, tanks, pumps, pressure checks, and certain other operations which make a trained firing crew necessary for launching liquid rockets."

The Nike booster is the first stage of the rocket—the Cajun is the instrument carrying second stage. The missile is 26 ft. long and weighs 1535 lbs. at take-off. When fired, the Nike booster burns out in 3.3 seconds, or at an approximate height of 6450 ft. Top speed during this initial stage is Mach 3.2, or 3.2 times the speed of sound. Air drag pulls the first stage away from the second as the rocket coasts for about 11 seconds reaching an altitude of approximately 29,300 ft. At this point the second stage Cajun ignites, accelerating for 3 seconds before burnout at 41,000 ft.—reaching a maximum speed of Mach 6.3 and continuing to rise until it reaches its trajectory peak of 528,000 ft. (100 miles).

Electronic measuring devices carried aloft by the rocket supply scientists with desired information. For example, in one experiment, a small sphere is ejected from the instrumentation at an altitude of 198,000 ft. This 11-lb. "brain" continues to coast upward, free of the carrier, to a height of approximately 100 miles. Within the sphere is an omni-directional accelerometer which transmits data to listening stations from the time it is ejected from the rocket until it falls back to earth. The accelerometer measures the drag of the high-flying sphere, a function of density and velocity.

In addition to the U of M experiments, the State University of Iowa will fire 16 Nike-Cajuns at Churchill with instrumentation for measuring cosmic rays and auroral radiations. The Naval Research Laboratory will launch 16 Nike-Deacons (the Cajun is essentially a Deacon with a modern propellent) at Point Mugu equipped to measure X-rays during solar flares. The New Mexico College of Agriculture and Mechanic Arts will use Nike-Cajuns to photograph hurricanes on the east coast.

Nike-Cajuns will also be used in the Signal Engineering Laboratories' "Grenade" experiment (concerned with upper atmospheric temperature and winds) and the Ballistic Research Laboratory study (of electron density and the earth's magnetic field).

The Nike-Cajun project should fill many gaps in man's knowledge of terrestial phenomena, and may pave the way for our first expeditions into outer space. And it proves that man continues to be a curious creature who will never stop wondering why things happen on mother earth. Nor will he be satisfied until he finds out what lies on the other side of the Milky Way . . . and probably not even then.

Concrete Poured for Ill. Toll Highways

A mammoth train of mixing and spreading machines, straddling 25 feet of roadway, began pouring the first concrete at Rockford on July 3 for Illinois' 187 miles of ultra-modern tollways.

Charles L. Dearing, executive director of the Illinois State Toll Highway Commission, announced that the paving of four-lane roadway for the North Illinois Tollway in Winnebago county had begun less than ten months after breaking of ground for the project last Sept. 22.

Scene of the assembly-line operation was construction section N-2A, a 4.77-mile segment of both the North Illinois Tollway and the Chicago-to-Madison federal-aid interstate expressway route FAI 01.

Starting south from Hunter road along the west (southbound) strip of the tollway, the first of two giant mixers led the assembly line by pouring a 25-foot-wide bottom layer of concrete six inches deep. As reinforcing wire mesh was placed, a second mixer followed close behind, pouring a four-inch top layer across the 25-foot roadbed.

When crews, working ten hours a day six days a week, have completed paving the southbound strip as far as a "trumpet" interchange at US Route 20, they will turn north and pave the east (northbound) lanes. By the time they return

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to Hunter road, completion of sub-base work to the north is expected to permit paving there.

George L. Jackson, MWSE, chief engineer of the commission, said "paving trains" would soon be familiar sights in many sections of the project. He said contract specifications call for 10-inch reinforced concrete pavement throughout the 187 miles with four inches of free-draining granular sub-base and 10 inches of high-density selected subgrade beneath. The four-lane divided highway, as called for in N-2A, will have 11-foot-wide outside shoulders and 5-foot-wide inside shoulders, each of bituminous concrete. Pavements will be separated by a 50-foot-wide depressed median strip.

The firm of Warren & Van Praag, Inc., is in charge of design and construction supervision in N-2A under the direction of Joseph K. Knoerle & Associates, Inc., consulting engineers to the commission. The prime contractor is Public Constructors, Inc.

Chimney Economics

In Missouri, a power company learned it was cheaper to build a smokestack 36 years ago than it is to rip one down today, reports *Electrical World*. The company paid $8,740 to build the stack in 1921. It cost $13,470 to have it torn down.

Bankers Back Cleveland Center

With an anchor to windward in the form of the largest money commitment of its type to be made in Cleveland since the depression days of the 1930's, construction of a $1,525,000 Cleveland Engineering and Scientific Center on Chester Avenue near East 30th Street will begin immediately.

Exemplifying the growth and importance of engineering in the industrial northeastern Ohio area, the new structure will provide adequate meeting facilities for more than 53 engineering and technical groups and through its overall program of individually organized activities will be a Center for continuing technical education.

Although the Building Fund campaign is still short of its goal, the decision to proceed immediately with construction was made by the Board of Governors of the Cleveland Engineering Society, owners and operators of the building, after urgings by industrial and community leaders and by representatives of member groups of the Cleveland Technical Societies Council, a cooperating body of more than 50 local chapters of national groups with a total membership of an estimated 13,000 engineers, architects, scientists and other technical specialists.

Turning point in the consideration of whether to proceed now with construction or to wait until more funds were raised was an expression of faith in the engineering profession and in the future of Greater Cleveland from the banking circles.

Recognizing the importance of the new Center to the industrial health of the community, The Cleveland Trust Company offered a loan commitment of up to $600,000 to insure a prompt start on construction. In making this commitment, I. F. Freiberger, chairman of the board, commented:

"We have watched the growth of this project with considerable interest. We felt that the Cleveland Engineering and Scientific Center would be an asset to industry and the community and as such deserved our financial support, pending the outcome of the campaign for contributions.

"Since the project was first conceived three years ago, the validity of the need for the Center has stood the test of time. Engineering participation in industrial activity in the northeastern Ohio area has continued to become more important and more acute each year. If our industries are to continue to provide full employment and to make even greater contributions to the country's overall economy, we must have a facility in Cleveland which will be a factor in attracting and holding qualified technical personnel.

"We believe that Cleveland is growing, not deteriorating. We believe in the integrity and pride of industries and the people which make up our community. We believe that all of us are conscious of our responsibilities to that community and to the part we individually must play whenever there is progress.

"It is our privilege to have a part in giving Greater Cleveland one of the country's finest engineering and scientific centers."

Warren H. Chase, president of the Cleveland Engineering Society and vice president of the Ohio Bell Telephone Co., in announcing that construction of the new Center would begin immediately stated that an intensive fund raising campaign to obtain the $650,000 still lacking of the $1,525,000 goal would be conducted during the period of construction.

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"Because of the clear cut vote of confidence as expressed by representative individuals, companies and technical organizations," Chase commented, "we feel confident in going forward with the project to give the community an asset not found in many other industrial centers. We feel confident, too, that the additional support needed to create this facility will be forthcoming."

Chase revealed that more than 250 companies and 3,500 individuals have participated in the program and that additional and new pledges are being received every day.

Over the past three years many outstanding industrial leaders have been identified with the fund raising campaign. They include: Roscoe H. Smith, secretary, Reliance Electric & Engineering Co.; Warner Seely, vice president, Warner & Swasey Co.; Sam Littlejohn, commercial vice president, General Electric Co.; Carlton R. Sabin, partner, Sabin Engineering Co., and Julius C. Strasbourger, general supervisor, Illuminating Co.

The Executive Committee guiding the campaign consisted of: Clarence J. Beller, William Benninghoff, Albert Casey, G. Brooks Earnest, Clarence W. Fick, Harry Gellin, Joseph H. Gepfert, William R. Hough, Benjamin A. Smith, Seely and Chase.

Initial phase of construction of the new Center has already started with the demolition of existing buildings by Gillmore-Olsen Co., general contractor who was low bidder among seven of the area's leading contractors bidding on the project. Ground breaking ceremonies were held on the Chester Ave. site on April 24th and occupancy is expected during the summer of 1958.

The two and a half story structure with a five story tower was designed by Garfield, Harris, Schafer, Flynn and Williams, architects. Consulting engineering work was under the direction of Osborn Engineering Co.

The Cleveland Engineering and Scientific Center will have approximately 50,000 square feet of floor space or about three times the space now available at the Cleveland Engineering Society's present building, a remodeled telephone exchange.

The Center will have an auditorium of approximately 900 seating; a single-purpose, slanted floor auditorium to accommodate 150 people; a main dining room serving 350 people and three special dining-meeting rooms and class rooms. The auditorium, and an adjacent future dining room, are designed for heavy loading for exhibition purposes. Office space is also available for society offices and special services, such as mailing and duplication, will also be offered.

ASTM Meeting Draws Record Crowd

A varied technical program, strong in information useful to industry, covered a wide range of important data on engineering materials at the 60th Annual Meeting of the American Society for Testing Materials at Atlantic City, June 17-21. Highlighting the technical program were symposiums on the Radiation Effects on Materials, Spectrochemical Analysis for Trace Elements, and the Marburg and Gillett Lectures on industrial water and molybdenum-base alloys, respectively.

A recorded attendance of 2932 again made it the largest meeting in the Society's history. There were 31 technical sessions and over 700 technical committee meetings held during the five-day meeting. The vigorous work of the Society's many technical committees for many months was concluded with the presentation of their reports at the meeting.

I.I.T. to Offer Fall Graduate Program in Sanitary Engineering

A graduate program in sanitary engineering — stressing the fundamental sciences — will be offered this fall at Illinois Institute of Technology.

The program will produce an engineer-scientist who can perform well in any branch of sanitary engineering, according to Elmer I. Fiesenheiser, director of Illinois Tech's civil engineering department.

Four foundation courses make up the program:

—Sanitary science, covering principles of inorganic chemistry, organic chemistry, biochemistry, nuclear physics, and biological decomposition.

—Sanitary engineering analyses, emphasizing derivation and analysis of data for use in rational design.

—Unit operations and processes in sanitary engineering, covering the rational design of the operations and processes used in sanitary engineering.

—Design of sanitary engineering treatment processes, dealing with the application of unit operations and processes to the design of the over-all treatment processes.

Admission is open to students with engineering bachelor's degrees. Both day and evening courses will be offered.

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Metal Cutting Research Important

"Every year, more than 15 million tons of metal are whittled away into chips at a cost of more than 10 billions of dollars!" This statement was made on May 15 in a press conference in Detroit sponsored by the Research Fund of the American Society of Tool Engineers on the latest developments of ASTE's huge, long-range Metal Cutting Research Project.

Hans Ernst, director of research, The Cincinnati Milling Machine Co., and a member of the ASTE Research Fund Metal Cutting Steering Committee followed the above startling statement with additional data demonstrating the economic importance of metal cutting research to U. S. industry. If improvement in machining methods through research should save only ten per cent of this cost it would add more than a billion dollars to our economy.

Dr. W. W. Gilbert, manager machinability development, General Electric Co., and also a member of the ASTE Research Fund's Metal Cutting Steering Committee, advised that G.E.'s scientific approach to solving metal cutting problems, has resulted in substantial increases in production. By using presently available metal cutting knowledge, it has been possible to double the rate of metal cutting in most cases, and to increase it as much as ten times in several operations.

Col. L. S. Fletcher, ASTE Research Fund Director, said, "Industry's need for more and better information in metal cutting was readily apparent, and met with such enthusiastic response that the ASTE Research Fund decided to sponsor basic metal cutting research."

An essential requirement was that the enormous project would be attacked step-by-step. The overall program is expected to require a minimum of five years to complete.

W. S. Budington, associate librarian, Research Information Service, The John Crerar Library, presented a progress report on the initial development to be completed in the Fall of 1957. This consists of the compilation of a Metal Cutting Bibliography with specially prepared abstracts of all available information from 1943 to date. The Crerar Bibliography for ASTE begins where the last previously published Bibliography ceased in 1943.

Preparation involved four principal phases starting with the location of some 10,000 items which formed the basis of the work. Brief abstracts were prepared from 6,000 of these items which lay within the scope of the project. Each finished reference was then edited and coded for use in the detailed Subject Index and finally, reference and abstract were listed together with separate author and subject index cards. The final book will complete the first stage of the ASTE Metal Cutting Research Project.

The second stage is an evaluation of all metal cutting literature—a task assigned to the Battelle Memorial Institute. Dr. F. W. Boulger, chief of the Institute's Division of Ferrous Metallurgy submitted a list of tentative conclusions in his progress report. Following a discussion with outstanding research workers and practical engineers in the metal cutting field, final conclusions will be incorporated in a report carefully outlining all theories of metal cutting which Battelle's study has shown to be tenable. Areas in which further research is needed will be indicated. This second stage will be completed in the spring of 1958.

The third stage was announced for the first time at the press conference of May 15; the ASTE Research Fund advised that it will seek ways and means of establishing standardized machinability test procedures. With the establishment of unified standards in machinability tests, industry would stand to save millions in dollars and hours. The situation has been compared to the position of two men attempting to measure the size of a room, when neither of them agreed on the length of an inch.

Commenting on the overall ASTE Metal Cutting Research program Col. L. S. Fletcher, research director said, "The ASTE Research Fund recognizes that it is embarking on a long term, broad, research program. It also realizes that such a program can be successful only if industry accepts the major share of the burden. We are hopeful that industry, which has such a high stake in the results, will enthusiastically accept the leadership of the ASTE Research Fund and provide the required assistance."

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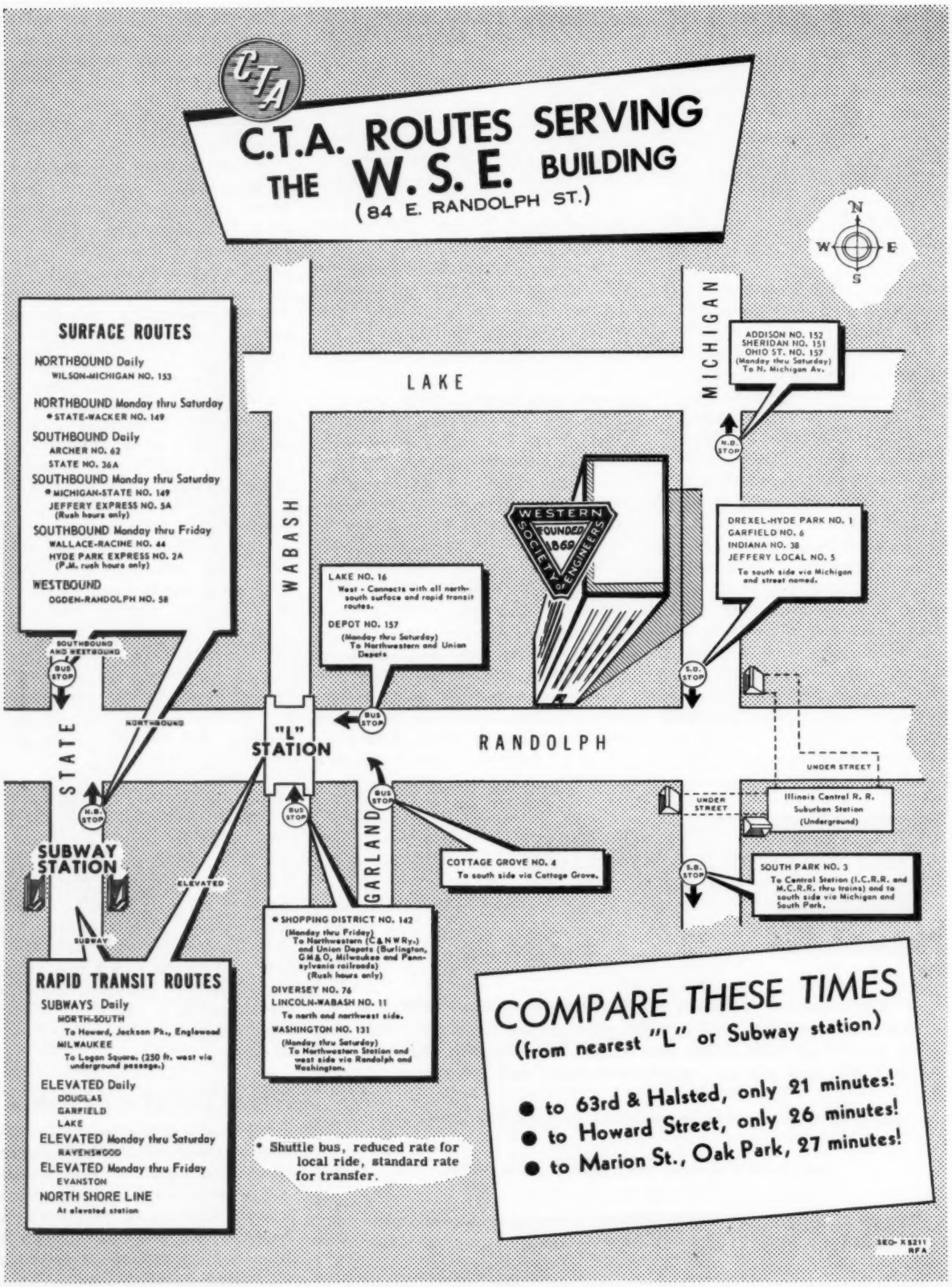
New Twist in Fibers

A new twist in fiber research is being taken by University of Illinois scientists, reports *Chemical Week*. They're feeding raw sulfur to sheep—a technique that prevents shrinkage of the sheep's wool. Apparently, the sulfur finds its way into the wool fibers to form a type of molecular bridge.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TV May Improve U.S. Education

Television has "a tremendous potential in improving the very basis of American education," the Summer General Meeting of the American Institute of Electrical Engineers was told in Montreal, Que., on June 28 in a session describing a closed circuit TV installation in the school system at Hagerstown, Md.

The TV system in eight schools at Hagerstown, is used by 6,000 pupils and eventually will encompass all 48 schools in Washington County, Md., which has 18,000 pupils, Max H. Kraus, of Jerrold Electronics Corporation, Philadelphia, Pa., said in one of four pages describing the TV system.

The television installation at Hagerstown, said Kraus, is "providing low-cost, reliable television to some 6,000 pupils, with planned expansion to over 18,000 students. Already the overall program has proven itself to have a tremendous potential in improving the very basis of American education."

In another paper, John R. Brugger, a member of the Hagerstown Board of Education, said the TV system by Sept. 1957 would include addition of 6,000 square feet of operating space, in addition to the 5,000 already in use; a total of five live video studios; six operating channels, five of which are for live use; 21 elementary schools and two high schools receiving an aggregate of 27 lessons daily on approximately 510 television sets; participation of approximately 12,000 students in direct and supplemental instruction programs.

The 1957-58 program also includes these possibilities, he said: erection of a low power ultra high frequency transmitter for telecasting instructional programs to the community at high school and junior college level; installation of microwave equipment for two-way telecasting to a teachers college in a nearby community; equipping a mobile unit for local special event coverage.

The opening of the Sept., 1958 school term will conclude the technical expansion of the five year project, he said. Anticipated additional equipment will include a live color studio equipped with dual camera chains; approximately 60 color receivers; 25 additional school distribution systems for the balance of schools in Washington county, and addition of 400 television sets.

"Television offers tremendous possibilities in televised education in the following ways," said Bruger: "ease and expediency in presentation of instructional information; facility of magnification of picture information by choice of lens; ability of the teacher to concentrate the students' attention on a fixed area; uniformity of instruction, and finally, to say that, had he lived longer, Einstein may have been a direct classroom instructor for every science student in the country through the medium of television, may be the understatement of the century."

1958 Nuclear Congress

Industrializing the Atom will be the key theme for the 1958 Nuclear Congress now definitely set for March 17 through 21 at Chicago's International Amphitheater. With plans well underway, sessions are tentatively scheduled to cover economics, finance, future plans, and much more.

Co-ordinated by EJC, for its member societies, managed by American Institute of Chemical Engineers and sponsored by the engineering and scientific societies interested in the nuclear field, the 1958 Congress promises to be bigger than ever. Once again the Hot Laboratories and Equipment Conference, and the National Industrial Conference Board's Atomic Energy in Industry Conference will be a part of the 1958 Nuclear Congress.

A major part of the Nuclear Congress will again be the International Atomic Exposition where engineers, scientists and management men can see and discuss with industrial representatives, all nuclear processes and materials currently available. At Philadelphia in 1957, a total of 16,429 engineers, managers and scientists attended the Exposition. With the advances a year can bring to the rapidly growing industry, the 1958 Exposition should attract many more.

Under the leadership of John R. Dunning, chairman of the Nuclear Congress Policy Board, Bruce R. Prentice, chairman of the General Committee, and John W. Landis, chairman of the NESC Conference Committee, the 1958 Nuclear Congress is expected to mirror all the advances of the nuclear field.

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New Power Supply Improves Defenses

A streamlining operation on the electronic brains that defend the skies over the United States was described in Montreal, Que., on June 26 at the Summer General Meeting of the American Institute of Electrical Engineers.

It is a simpler power system that probably will mean increased reliability for the computers that guide SAGE (Semi-Automatic Ground Environment) System, J. J. Gano, of J. J. Gano & Associates, Cambridge, Mass., and formerly of Lincoln Laboratory, Massachusetts Institute of Technology, said in a paper.

Simplification of the computer set-up is accomplished by substituting on-the-spot generation of electric power, instead of relying on outside power, the voltage of which must be closely regulated by motor-generators before being fed to the computers, he said.

Gano said that the simpler power supply will result in approximately one computer error in two years, about the same as with use of motor-generators.

SAGE, he said, "contains a large number of weapons-direction centers equipped with high speed electronic digital computers for the continuous processing of vast quantities of information. It is necessary that substantially all voltage transients which might cause computer errors be prevented from entering the electronic system." At the first two centers public utility power and local diesel generators operated in parallel, the latter being used as stand-by power in case of failure of the utility power. In subsequent centers the public utility tie was eliminated and investigation showed that the motor generators could be eliminated without affecting the reliability of the computers.

"Using conservative methods throughout the investigation," Gano said, "the elimination of motor-generator sets as voltage transient buffers will produce one error every two years for each computer in SAGE installations having no utility power source and generation on site. Motor-generator sets and associated switchgear with their extensive relay control systems and voltage regulators would produce about the same number of computer errors because of equipment function. Furthermore, the estimated number of errors thus produced is far below that which may be expected as a result of component difficulties in the vast electronic system. The decision to eliminate the motor-generator sets is logical. The result is a simpler power system with reduced initial costs, maintenance, and power consumption, and a probable increase in reliability because of operation with separated buses."

Watthour Meter Gets Better Stator

An improved watthour meter, said to include the first significant changes in stator design in 30 years, was described in Montreal, Que., on June 26 by two General Electric Company engineers during the Summer General Meeting of the American Institute of Electrical Engineers.

The meter, said J. G. Landry and J. F. Scamman, of Somersworth, N. H., has marked improvement in performance and lower inherent manufacturing costs than a conventional meter of the same heavy load capacity.

The meter was designed after it was found that conventional meters had performance drawbacks, particularly at light loads, although the continuing steady increase in electrical energy resulted in the greater use of these meters. Significant improvement of these meters could not be achieved because of the inherent characteristics of their stators.

"A completely new approach was undertaken which resulted in, first of all, a simple single turn current coil for each of the two current circuits in the meter. This new construction completely eliminates all of the undesirable side effects such as higher losses, torque depression and other effects. . . . A second important improvement has been obtained by magnetically separating the current and potential fluxes and the two electromagnets become more responsive to changes in the values they measure."

They said that a major consideration was determining the rating of the new meter. "An evaluation of the inherent calibration linearity and low damping errors indicated the desirability of designing the meter for a full load test current rating of 30 amperes. Specifically, the reduction of heavy load damping errors will now permit accurate metering at a higher rotor speed and such a rating will provide maximum accuracy at light loads. This change in nominal rating from the historic 50 amperes would normally be expected to pose new problems in rotor bearing design because of higher speeds and greater side thrust at maximum load. However, the magnetically suspended rotor bearing system of this meter is fully capable of operating under these conditions without any difficulties.

"It is the opinion of the authors and others conversant with watthour meter

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design that this new meter incorporates the first significant changes in stator design in the past 30 years. . . . The principles involved in the stator design are equally applicable to multistator watt-hour meters."

In-flight System Will Extend Range

A new in-flight refueling system, developed by Thieblot Aircraft Company of Bethesda, Md., a division of Vitro Corporation of America, is designed to extend the range of current and future tactical aircraft, it was revealed July 8.

The system, now declassified by the Air Force, includes a Flying Pipe unit enabling a jet fighter to transfer fuel to another at altitudes above 30,000 feet and at speeds over 530 miles per hour. The system was developed by Thieblot over the past two years under contract to the Aircraft Laboratory of Wright Air Development Center, Dayton, Ohio, and is now being flight-tested.

The Flying Pipe enables any tactical aircraft to be converted quickly into an airborne tanker. It provides Tactical Air Command with the ability to "get thar fustest with the mostest," says J. Robert Kirby, Thieblot vice president.

Unlike other in-flight refueling packages which require slow speeds and handle sluggishly, the Flying Pipe assures speed and altitude compatibility between refueling gear and modern attack aircraft.

The refueling package can be shackled quickly to the underside of the wing of any ordinary jet aircraft and can be jettisoned in case of emergency.

With the flick of a switch, the tanker-jet pilot can extend two pipes through the bottom of the package. The pipes fall out to form an inverted T, as the horizontal Flying Pipe aligns itself with the free air stream. Fuel is transferred through a valve attached to its aft end.

In practice, the pilot of the jet to be refueled maneuvers his plane so that the intake nozzle mounted on it slides into the Flying Pipe valve. The package then pumps fuel through the pipes into the receiver airplane.

The Flying Pipe, so named because it is aerodynamically balanced and streamlined to hold a straight and level course, can be extended or retracted at will and is equipped with built-in safety features.

If the receiver aircraft, while refueling or attempting to make contact, flies outside a predetermined "safety zone," the linkage is automatically retracted. It also retracts automatically if the receiver aircraft approaches the tanker at speed too high for successful coupling.

The refueling package itself looks like and is mounted like present external store units, and can be attached quickly to any compatible aircraft. Modification of aircraft for the unit consists only of control wiring. The system will accommodate current and future fighter, fighter-bomber and bomber aircraft, including the century series of jet fighters and bombers like the B-47, B-57 and B-58.

Engineer Foundation Receives G.M. Stock

Another boost to engineering and scientific research is announced by Engineering Foundation, whose endowment fund has recently been increased by one hundred shares of General Motors stock, the generous gift of Professor Orlan W. Boston, of Ann Arbor, Michigan. Professor Boston, a fellow of The American Society of Mechanical Engineers and distinguished educator, directed that the stock is to be invested by United Engineering Trustees, Inc., custodian of the Foundation's funds, and the income from it "used for the furtherance of research in science and engineering."

An alumnus of the University of Michigan, Orlan Boston was a member of its engineering faculty for 40 years and is now emeritus professor of mechanical and production engineering. In his long connection with the university he played an active part in establishing a Department of Production Engineering, which now offers the most complete industrial engineering curriculum in the country. With his teaching Professor Boston combined experimental work in metal cutting. His extensive studies in this field have been reported in several widely used textbooks and many articles on machine tools, cutting fluids, metal cutting, and associated subjects. One of his recent important publications is the ASME Manual on the Cutting of Metals.

Professor Boston's gift to Engineering Foundation typifies the growing awareness of the individual engineer of the need for more engineering and scientific research and of the vital role the Foundation plays in stimulating and supporting research programs. Established in 1914, Engineering Foundation was a pioneer in recognizing the need for research in the sciences and engineering. Its currert endowment fund is in the neighborhood of $1,500,000.00.

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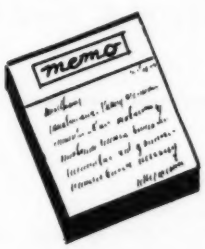

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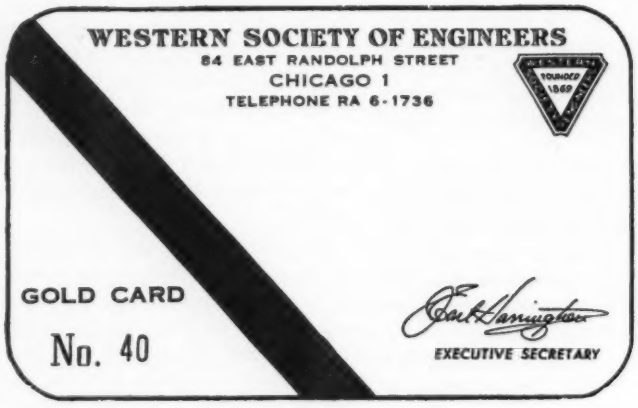

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Air Pollution Group Moves Headquarters

The independent Air Pollution Foundation, headquartered in downtown Los Angeles since its establishment three years ago, moved its offices on June 1 to 2556 Mission Street, San Marino, Calif.

A. J. Gock, president, said the new location was selected to bring the Foundation staff closer to scientific laboratories in Pasadena and South Pasadena where major portions of the Foundation's smog research program are being conducted.

Gock added that the northern section of the Los Angeles Basin is becoming the "center of gravity of scientific activity in this area having to do with air pollution research," and that the move will enable Foundation scientists to spend more time in consultation with several other laboratories and instrument companies which are working on various aspects of the smog problem.

The Foundation is a scientific research organization, privately supported by a broad cross section of business, industry, and commerce to study the basic causes of smog and to aid in development of workable controls.

Because the Foundation's research program has required laboratory and testing facilities of many different types, construction of a single installation adequately equipped to meet all its needs has been viewed as economically unfeasible. For this reason, the Foundation's numerous projects have been conducted under contract at existing institutes and laboratories throughout the nation, each selected for its ability to carry out specific types of work.

Dr. W. L. Faith, managing director, pointed out that the Foundation's key work locally is now being done in South Pasadena at the Stanford Research Institute facility and in Pasadena at California Institute of Technology, both only a few blocks from the Foundation's new headquarters.

In South Pasadena, studies are under way to determine which type of control device for auto exhaust will be most effective in alleviating the eye irritation that usually accompanies smog.

At Caltech, two separate lines of scientific inquiry are being followed under Foundation grants. One, now in its third year, deals with carbon and hydrogen isotopes of various smog components. The other, currently in its second year, deals with aerosol formations which result in reduced visibility on smoggy days.

Turbine Combination Will Conserve Fuel

Man's untiring efforts to get more "muscle power" out of heat and other energy which might ordinarily go up the chimney will receive a practical demonstration when the Crisp County (Ga.) Power Commission's new generating "Plant Crisp" goes "on the line" in March, 1958.

For the plant, The Babcock & Wilcox Company has developed a waste heat and power boiler to be used in a unique system in which pressure heat and unburned oxygen exhausted from a simple cycle gas turbine will be used to help generate steam and drive a second turbine. While several power stations are using gas turine-steam turbine cycles for greater fuel efficiency, the Warwick, Ga., installation will be the first time such a system has ever been designed from the start as a combined operation, according to W. Dan Sinclair, manager and chief engineer of the Crisp County electric generating system.

The steam boiler itself will burn pulverized coal, natural gas, or oil. Exhaust from the gas turbine will flow to the boiler at 840 degrees F. and will assist the boiler in reaching the high temperatures required to convert 130,000 pounds of water to steam every hour. In addition, the gas turbine exhaust will be put to work on other jobs in the steam boiler, including drying and transporting coal for two pulverizers, and heating feed water by an economizer.

The combination gas turbine-steam turbine plant will be the Power Commission's first use of steam for generating electricity on a large scale. When operated as a combined cycle, the efficiency of the combination plant is well above the average of the conventional steam operated plant of comparable size, according to Manager-Chief Engineer Sinclair. Also, when operated in combination with the utility's hydro-electric plant, the efficiency will still be greater, resulting in lower generating cost per kw/hr, he adds.

The flexibility of the electric generating system will insure dependable low cost power at all times, whether operating as a steam turbine, as a gas turbine, or as hydro-electric units, Mr. Sinclair believes. The combined cycle of all of these units, he states, will result in greater efficiency and lower generating costs to the customers of the Commission.

Accurate Timepiece

An "atomic clock" that would have an error of only three seconds in 100 years is now under study, reports *Aviation Week*. If developed, the clock would be used for aircraft navigation.

For Daytime TV

A picture tube for daytime television watchers may soon be on the market, reports *Product Engineering*. Pictures on the new tube can be seen in spite of a bright light shining on it. The tube will offer television viewing, even in sunlight, without loss of contrast.

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Banking

(Continued from Page 6)

viously seems to impose a hardship at times on those who once were accustomed to banking with a wide open door and a very low price of admission. It is only natural for those who observe the change to feel that aspirations and plans that are regarded as necessary have to be reviewed. Yet, it is my firm opinion that under such circumstances, a statesmanlike approach on the part of all of us is essential.

You may be sure that our monetary authorities and the banking fraternity are as fully conscious of the need for great new highways as any other groups in our nation. But they are also aware of the need for schools and other civic improvements. They also understand that our ability to progress on a strong foundation ultimately rests upon our productivity, and that programs for capital expansion and technological improvement hold the greatest promise for the attainment of that progress. They further recognize the cost of our essential national defense as a heavy drain against our budget and tax-paying ability. In short, they must weigh all of these and other claims against our economic resources — whether asserted through channels of credit or taxation.

We must take into consideration that the danger of inflation is real, and that it is a problem for all of us. This has been pointed up recently by President Eisenhower, who said in his State of the Union message:

"But it is clear that the danger is always present, particularly if the Government might become profligate in its expenditures or private groups might ignore all the possible results on our economy of unwise struggles for immediate gain.

"This danger requires a firm resolution that the Federal Government shall utilize only a prudent share of the nation's resources, that it shall live within its means, carefully measuring against need, alternative proposals for expenditures."

First, I should add that government should practice what it preaches. However, because these factors exist in our presently fully-employed economy, therefore, it is comforting to know that we are relying upon the dynamic forces of competitive markets to allocate our nation's resources—that is, to decide which of our goals and aspirations are to take priority. This, I believe, is an infinitely better way of testing our democratic processes and calling forth the resourcefulness of our economic system than the rigid straight-jacket of the planned economy typified by the Soviet system. It means that we can avoid the need for making such arbitrary decisions as to whether it is more essential to provide structural steel for a highway bridge, for the schools that will generate our greatest asset—trained people, for new facilities to increase steel-making capacity, or for new equipment to produce other roadbuilding materials.

Tangible Contributions

Now as to some tangible contributions that bankers can make beyond that of helping to preserve stability. First, let me remind you that the new highway program is being heralded as the greatest single public works program in our nation's history. In this program we are talking today in terms of 100 billion dollars, taking into account the Federal aid and the secondary and local networks. It is well to reflect upon what 100 billion dollars might have bought in highways only ten or twenty years ago. Moreover, it will help our thinking as to how much of the long-range program we can hope to obtain if costs are permitted to continue to climb.

The point is that inflation of costs raises havoc with long-range planning. In periods when inflationary pressures are strong, the best conceived financial program runs out of money before completion, and new sights have to be set. This, again, emphasizes the stake we all have as Americans in the goal of stability. We must preserve stability, and the value of our money, or we will lose all.

It is significant that, under the prevailing atmosphere of long-range optimism and exuberance over the prospects for growth, the approach toward public works planning has also been modified. Not very long ago, the building of public roads and many other civic improvements was looked upon by many as a

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natural instrument for economic planning—as a vehicle through which fiscal policies of Government could be employed as an economic stabilizer. Public works, it was felt, could make up the deficiency in private spending and could generate a flow of income that would tide us over setbacks in the non-Government section of the economy. The weakness of this compensatory fiscal policy theory is clearly demonstrated in our approach today to highways, schools, homes, etc. In a growing economy, we cannot always wait to do things that are part of our very process of growing, for fear of a recession that we really hope may never come.

I should like to emphasize at this point, that the attitude of banks is not negative under conditions of monetary restraint. It bears repeating that the resources of our banking system are being used to an extent never before experienced. Our loans are at an all-time high, and their increase over the past two years to all types of business—large and small—has been the largest on record. The credit wheels are still spinning, even though of necessity banks have to be more selective in their lending and investing operations, because there are just not enough available funds to do everything so many of us want to do at the same time.

These are times in which the financial community should exercise a high degree of statesmanship in the granting of credit. This policy should hold much reassurance for you and the entire business community. It is worthy of your full support, because a discriminating lending policy—the encouragement of sound and productive loans and a dim view toward speculative and unproductive uses of credit—can aid materially to channel funds where they will help solve the bottlenecks which breed inflationary pressures.

The lending and investing operations of banks touch practically every phase of our national economic life, and you will find that every step of the way our banking institutions will be prepared, under prudent standards of safety, to grant worthy borrowers the credit they need for useful purposes. If any of you in the road-building industry still have any further doubt about that, you will be heartened by the kind tribute paid to our banks by one of your members, Mr. Harmon S. Eberhard, President of the Caterpillar Tractor Company.

In addressing our own Association's recent conference of top lending officers of banks, he stated:

". . . In looking toward the future—and in suggesting things for your accomplishment there—I could only ask for more of the same helpful, cooperative spirit you have already demonstrated.

Banks . . . Have Fulfilled . . .

"Banks and bankers have fulfilled a vital part in the growth of America's industries. The newer and more rapidly growing the industries, the more important is your part in providing a source of credit. In tomorrow's new world, our much-needed bigger and safer highway system seems somehow the symbol and the key. I believe that bank credit men today are better informed and, therefore, better prepared than ever before to play a bigger-than-ever role in the building of The Roads Ahead."

Those of us in banking expect to meet that challenge.

Mr. Eberhard speaks on behalf of the Equipment sector of the road-building industry. Let me reassure you that the same spirit will continue to typify bank relations with other sectors of the business world upon which the success of our goals for better roads will finally depend. Sound bank credit will be made available for the development and production of raw materials; for their distribution through channels of consumption; for the creation of new industrial facilities and equipment to improve our business efficiency; for the production of the equipment used in the road-building industry, as well as for the dealers who sell it and the operators who put it to work; for the governmental units who will plan and execute the program; and, finally, for the vehicles which will speed along the dream highways of tomorrow. In short, our willingness to serve the sound credit needs of a growing America will run the gamut of economic life. This spirit, I believe, typifies the part that bankers are destined to

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And it is the source of some satisfaction that recently there has been some indication that the period of "tight money" might have reached its peak. Money is now more available in many quarters than during any recent period, and is responding to the higher interest rates now prevailing. Substantial repayments of loans and other adjustments have brought about a calmer atmosphere in many financial quarters.

In conclusion, I want to assure you that bankers welcome the privilege of this partnership with your great industry in this challenge to our nation. Measured in dollar terms, the highway program is a gigantic long-range and far-reaching business proposition. Finance, of course, is functionally the responsibility of the banker. But may I invite your attention to the fact that bankers are also proud of the role they play in community life. Apart from dealing with money matters, they take seriously their responsibility for civic improvement — of which our highway problem is so vital a part. They understand that the well-being of their own institutions depends upon the progress of their communities, and being at the nerve-center of commerce and industry, they have a big stake in that progress. Therefore, on behalf of my fellow bankers, may I hold out to the planners and builders of our highways of today and tomorrow a helping hand warmed by a community spirit. Our doors are open to you. Please come in! American banking will be ready and able to meet your worthy financial requirements.

'Pre-Plane' Training

Even before the planes are built, Air Force pilots will be racking up flying experience in the big four-jet KC-135 stratotankers, designed to refuel SAC B-52 bombers in mid-air, states *Electronics*. A $1.8 million flight simulator, consisting primarily of analog computers, is now making advanced training possible on the ground. In the simulated cockpit, controls are wired to a panel that feeds in flying conditions such as fuel controls, problems of handling the plane under varying loads while fuel is pumped from tanker, plus other normal and emergency problems of weather and mechanical failure.

Professor Calls for Fight Against Fog

A California Institute of Technology professor on June 11 called for all power plant operators to pool their resources in a fight on smog. Prof. A. F. Haagen-Smit, speaking at the semi-annual meeting of The American Society of Mechanical Engineers, in San Francisco, said that no matter what air pollution control processes are developed they will be expensive, but that demand for more complete control of industrial smoke will undoubtedly continue to increase.

Professor Haagen-Smit said that this situation calls for cooperation between all power-producing agencies, and pointed to the results achieved recently in Pittsburgh when a group of industries joined to reduce air pollution in that city. He added that in Los Angeles the activities of a Joint Research Council on Power Plant Air Pollution are a step in the right direction.

Recommendations contained in Professor Haagen-Smit's paper were based on an analysis of the causes of smog and a review of techniques used to reduce it, including various methods of removing irritating oxides of nitrogen and sulphur compounds from smokestack gases.

The paper pointed out that the initial cost of smoke-control equipment is high, often running into millions of dollars, and that, even if usable by-products are obtained from waste gases, the costs of operation are also high. In addition, if many industries start to produce and sell the same by-products, their price is likely to fall, thereby increasing the overall cost of smoke control still further.

A second paper at the session, which dealt with air pollution controls, was presented by Theodore A. Rich of the General Electric Company in Schenectady, who outlined methods that may be used by engineers to determine the number and average size of air-borne particles. Such information is helpful in calculating smoke density and the amount of dust settling to earth near a smokestack.

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Other topics scheduled to be discussed during the day at the ASME meeting included high-speed aircraft, machine design, gas turbines and nuclear engineering.

There is no Water Shortage: Partridge

There is no shortage of water except in specific localities. The problem is more one of collecting the water that falls as snow or rain, storing it and transporting it to the regions where it is needed.

That is the view expressed by Everett P. Partridge, director, Hall Laboratories, Inc., in his presentation of the Edgar Marburg Lecture at the 60th Annual ASTM Meeting, Atlantic City, June 17-21. Dr. Partridge emphasized the use of water as an engineering material and pointed out that industry's needs for water are largely on a loan basis—the bulk of the water used by industry is for cooling and, therefore, it is not consumed but merely borrowed and returned at a slightly higher temperature. The amount consumed corresponds to that which evaporates because the temperature is higher. Industrial water is also used for cooling by evaporation in spray towers and spray ponds. In this case the total amount of water borrowed is much less, although the volume consumed may be about the same, as when the water is used for cooling without evaporation.

Dr. Partridge observed that the wastes from man's activities including the industrial uses, complicate the re-use of water. The economics of eliminating or reducing these wastes discharged into the streams are extremely complicated. He gave as an example a calculation based on a few parts-per-million increase in solids content of a plant effluent costing many thousands of dollars for additional water treatment required for down-stream users of the water.

Turning to the uses of water in boilers, Dr. Partridge indicated that ultrapure water containing 50 parts per billion of total impurity is specified for certain applications such as a "once through boiler" in which all the water entering the boiler is converted to dry steam. Corrosion in boilers is not something that is likely to be eliminated but it can be controlled. The objective in the control of corrosion is to treat the water in such a way that a very dense coating of oxide is formed on the metal surface, thus greatly reducing the rate at which ions of iron migrate through the oxide coating to rob oxygen atoms from the water.

Petroleum Problems To be Discussed

Problems of one of the nation's key industries, petroleum, will be discussed by engineers representing all branches of operations during a three-day conference in Tulsa, Oklahoma, Sept. 23-25, it has been announced. The occasion will be the Twelfth Annual Conference of the Petroleum Division of The American Society of Mechanical Engineers to be held at the Hotel Mayo.

Included on the program are technical papers and panel discussions dealing with such topics as use of automatic techniques in production and processing of petroleum, offshore drilling techniques, military fuel handling and ways of getting more mileage from the limited supply of available engineering talent.

In addition to the more than 40 papers to be presented, there will be an unrehearsed panel discussion of the ASME Pressure Vessel Code, which outlines standard requirements for construction of much equipment used in the petroleum industry.

Another feature of the meeting will be luncheons at which representatives of five branches of the industry, materials, refining, manufacturing, transportation and production, will exchange ideas on mutual problems. There will also be a welcoming luncheon at which the Mayor of Tulsa, George E. Norvell, will speak.

Well Washed Scouts

Boy Scouts at the National Jamboree at Valley Forge were among the cleanest in the world, reports *Engineering News-Record*. Up to one-and-a-half million gallons of water a day were tapped from the Philadelphia water mains to keep the camp supplied.

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Foundries Turn to Shell Molding

Many sand foundries are turning to shell molding as a means of survival.

So says *Precision Metal Molding Magazine in* a special report just released. The magazine, published by the Industrial Publishing Corporation of Cleveland, is the nation's leading journal of the precision casting field.

The report is based on the magazine's survey of more than 400 shell mold casting producers, and it is the first such survey ever conducted among these concerns.

According to David W. Veit, PMM publishing director, "the demand for greater accuracy in product components by designers during the past five years has forced many foundries into the shell molding business.

"This decline in the use of sand castings stems principally from the rising cost of secondary operations often required on such castings."

Veit calls attention to the Bureau of Labor Statistics' figures which show that between 1939 and 1955, overall industry wages rose 300 per cent, while productivity per manhour rose only 28 per cent. Accordingly, then, the cost of secondary operations such as machining and grinding to establish accuracy have pushed the finished cost of sand castings fare out of line with economical production. And thus, partly due to these factors, sand foundries today hold only 20 per cent of the entire non-ferrous castings market, as compared to 40 per cent only five years ago.

"Shell mold castings, developed by the Germans during World War II, require far less machining, finishing and other secondary operations. Hence, they are far more attractive to the user company from a cost saving standpoint.

What is the make-up of the average shell mold foundry?

According to the *Precision Metal Molding* survey, today's typical concern previously operated a sand foundry, is less than five years old, has one or two shell mold machines, and expects to greatly increase its output soon.

In addition, the average shell mold foundry produces castings weighing less than five pounds in non-ferrous metal and sells to many segments of industry.

Veit notes that the "switch from sand to shell mold castings is on in a wide variety of manufacturing companies. The survey showed agriculture machinery, aircraft, refrigerators and air conditioners, general appliances and electrical equipment as being the most active."

"A typical example is a major automobile manufacturer which previously produced its own cam shafts as sand castings, who now produces these same components as shell mold castings."

Other information unearthed by the PMM survey is equally enlightening.

Of particular interest is the great diversification of alloys cast. Aluminum, copper, iron, steel and several other metals were mentioned prominently. The majority of the jobbing foundries mentioned at least two and often three or more metals, while captive foundries, in many instances, indicated specialization in one metal for obvious reasons.

While the average shell mold foundry produces castings weighing under five pounds, one foundry reported making a casting weighing 360 pounds, while another stated it had produced an 850-pound casting.

ASME Meets in Sept.

New developments in science and industry will be covered in the program of the Fall Meeting of The American Society of Mechanical Engineers just made public. The meeting, to be held Sept. 23-25 at the Statler Hotel, Hartford, Conn., is expected to attract Society members and other interested individuals from all parts of the country.

Among a dozen topics on the program are gas turbines for aircraft, the design of safe, efficient production machines, industrial management and materials handling.

Features of the program include a President's Luncheon on Sept. 23, when William F. Ryan, president of the ASME, will address the group, and a banquet to be held on the 24th. There will also be a panel discussion, on "What Can a Young Engineer Do to Develop Professionally," and, as a special feature, an inspection trip to the Electric Boat Company, manufacturers of America's atomic-powered submarines. Participants will take part in a submarine trip.

The Fall Meeting is being conducted by the national organization of the ASME in conjunction with its Hartford Section. General chairman for the meeting is Charles H. Coogan, Jr., of the Mechanical Engineering Department of the University of Connecticut.

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Reviews of Technical Books

Engineering Materials

The Science of Engineering Materials, edited by J. E. Goldman, John Wiley & Sons, Inc., New York 16, N.Y. 1957. 528 pages. Price $12.00.

Based on the Proceedings of the Carnegie Conference on the Impact of Solid State Science on Engineering Education, held at Carnegie Institute of Technology in 1954, the new book reflects the accelerating trend toward applying tools of basic science to the solution of engineering problems.

Recent insights into the basic nature of atoms and atomic aggregates have brought into use revolutionary new materials and improvements in many of the standard materials. This book aims to give the engineer a feeling for these advances in materials technology and how they have come about.

Seventeen contributors set down the principles of solid state physics as they apply to the explanation of properties of materials. Why materials behave as they do is the motivating question here, with qualitative explanations and interpretations given of the behavior of a variety of materials. Not only such important materials as metals, alloys, and semiconductors enter the discussion, but also cements, plastics, and glasses.

Following the forewords by Frederick Seitz and Raymond J. Seeger, four introductory chapters provide the necessary background in modern physics and give the general scope and terminology of solid state physics. This first part of the volume includes chapters on applications of solid-state science in engineering: an introductory survey; structure of atoms and atomic aggregates; accomplishments and limitations of solid-state theory; and crystal imperfections.

Part II covers those intrinsic and mechanical properties of a given metal or alloy system which depend on deviations from perfect structure. The influences of dislocations on the ultimate strength characteristics of metallic materials are discussed in detail. Part III gives an introduction to the status of present knowledge of surface structure and describes the important technological role played by surface phenomena.

The development of the transistor and the new magnetic materials has demonstrated the need for a thorough understanding of the atomic and molecular origins of macroscopic properties. Parts IV and V, then, cover semiconductors and magnetism. The final part of the book is devoted to noncrystalline materials.

Thermodynamics

Engineering Thermodynamics, by C. Osborn Mackey, John Wiley & Sons, Inc., New York 16, N.Y. 1957. 428 pages. Price $7.95. This new textbook is based on and supercedes the classic *Heat Power Engineering* by William N. Barnard, Frank O. Ellenwood, and Clarence Hirshfeld.

Principles are laid down in the early chapters which include the properties and processes of real gases as well as the general thermodynamic equations. Subsequent chapters, stressing applications, show the influence of recent developments in their treatment of one-dimensional flow of ideal gases with area change, friction and heat transfer; properties of mixtures of ideal gases; ideal-gas reactions; energy transformations in turbines; power cycles with real fluids; and other topics.

The increased importance of turbomachinery has also influenced the content of *Engineering Thermodynamics*. In chapter 10, centrifugal compressors and axial-flow compressors are included along with the conventional study of cycles of reciprocating compressors. Still later sections cover the use of combustion charts, in addition to the usual "air standard" cycles. In the discussion of power cycles of vapors, the author deals with the reheating cycle, regenerative cycle, reheating-regenerative cycles, and the two-fluid cycles that have been proposed for use in nuclear power plants.

The study of these and many other aspects of the subject are augmented by a profusion of exercises. Over 300 problems appear with answers and all are designed to illustrate the application of the important principles.

Electrical Circuits

Electrical Engineering Circuits, by Hugh Hildreth Skilling, John Wiley & Sons, Inc., New York 16, N.Y. 1957. 724 pages. Price $8.75.

Modern trends in electrical engineering thought, as emphasized by Dr. Skilling, lead to his inclusion of commonly neglected topics. Among the major concepts stressed here are network theorems, loop and node equations of networks, locus curves and other graphical methods, resonance of high-Q circuits, impedance and admittance functions, poles and zeros in the complex frequency plane, the transform concept, and the Laplace transformation. Special attention is also devoted to the algebra of complex quantities, following the line of thought of mathematicians. These topics, though new and somewhat unusual, are nevertheless built into the solid traditional material, augmenting it for practical use.

The chapter headings in *Electrical Engineering Circuits* consist of: six experiments; circuits; complex algebra; average power and effective current; analysis of simple circuits; substitution methods of analysis; resonance; graphical methods; network equations; solution of network equations; network theorems; coupled circuits and transformers; nonlinear elements; Fourier series; the exponential Fourier series and the Fourier integral; transient response and the complex frequency plane; the Laplace transformation; two-terminal-pair networks; electric filters; balanced three-phase circuits; and unbalanced three-phase circuits.

Dr. Skilling is professor of electrical engineering and head of that department at Stanford University.

U.S. Engineering Salaries Jump

A marked increase in engineering salaries in the United States in the past two years has been reported by the Committee on Salaries of the American Society of Civil Engineers. The Committee has presented the results of the fourth in its biennial series of surveys.

"Since the 1955 Salary Survey, engineering salaries have shown a marked increase," says the report. "As in previous years, the greatest per cent increases were recorded in the lower professional grades. Unlike previous years, however, the per cent increases remain relatively high up through Grade VIII."

The grades run through IX, ranging from Grade I, which includes supervised positions requiring professional training but little or no experience, to positions of administrative and professional direction of an important organization and positions requiring high specialized professional engineering or scientific ability. Grade IX represents top salaried employees charged with responsibility for major projects. Grade VIII includes assistants to technical and administrative heads.

The report continues about increases:

"The range is from about 20 per cent for Grade I to about 14 per cent for Grade VIII. This is an indication that the pressures producing the upward trend of salaries, originally felt only in the immediate post-graduation levels, now are being felt throughout the entire salary scale. The national average median entrance rate to Grade I shows the greatest two-year increase in dollars since the Survey began.

"The pattern within the various categories of professional practice does not follow, however. While the increases in the consulting field generally parallel the national averages, those recorded in the municipal and county field climb sharply in the higher grades. On the other hand, upper grades in the construction, State highway, utilities and industries show increases of much lower order of magnitude than the lower grades.

"Educational institutions showed percentage increases slightly lower than other areas of professional practice. They ranged from about 15 per cent for the instructor grade to about 10 per cent for heads of departments. These percentages were based on salary rates adjusted to an eleven-month basis. No attempt was made to evaluate additional income from consulting, research or other extracurricular sources."

The report explains that "no replies were solicited from Federal agencies since the civil service salary scale generally reflects Federal salaries throughout the country." Returns from a questionnaire were received from 297 organizations with a total of 47,716 engineering employees.

Sensitive

A thermometer that can sense a temperature change in less than one-millionth of a second has been developed, reports *Product Engineering*. Conventional thermometers take ten to 30 seconds to register any change. The new instrument will be used on aircraft and missile models undergoing tests.

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High Frequency Power Use to Change

A "quite different" future for the use of high frequency electric power was predicted in Montreal, Que., on June 26 at the Summer General Meeting of the American Institute of Electrical Engineers.

"The outlook in the future for the generating, distribution and use of high frequency power will be quite different from that experienced in the last ten or fifteen years," Vernon C. Geckler, of General Motors Corp., Bristol, Conn., said in a paper in a session on industrial power systems.

"With the exception of special applications where there is a large fixed high frequency requirement, automation and integration lines will dictate the use of smaller size generating units located and sized specifically for a particular production line. Generating units used for these integrated lines will not be direct connected units but V-Belt driven units on which the belts may be changed to vary the generator speed to gain a different frequency or variable speed drives will be used to change frequency. This means a greater number of units to maintain but the end results of integration will warrant the application of these small units. In the not too distant future it is very possible that there will be developed an electronic unit which will be sufficiently small in size as to be installed on any one machine tool and will have the ability to vary its frequency within the range requirements of this machine."

High frequency, he said, has and will have application for internal grinding, portable tools for high production lines, woodworking machines and commercial and industrial lighting. The last two would include auditoriums, gymnasiums, large store areas and large manufacturing floors.

Well Supplied

When U. S. troops hit the beach now, they will have a fuel supply in a hurry—and without rolling heavy oil drums around, says *Petroleum Week*. The new method, called the amphibious assault bulk fuel system, features 10,000-gal. collapsible tanks which are placed on the beaches. Fuel is pumped from the landing craft to the tanks, and from there onto units advancing in the field.

News of Engineers

The appointment of Donald Aden Hayes as chief metallurgist at the United States Steel Corporation's Gary Steel Works has been announced by John H. Vohr, general superintendent. Hayes succeeds Harold B. Wishart who has been assigned to the Corporation's Chicago metallurgical office.

Mr. Hayes began his association with the Corporation in 1940 as a process metallurgist in Pittsburgh. In 1941 he was assigned to the metallurgical department of the Homestead Works, Munhall, Pa. In December 1952 he was appointed chief metallurgist of the Edgar Thompson Works at Braddock, Pa., and in April 1954 was transferred to the same position at the Irvin Works, Dravosburg, Pa.

A native of Cumberland, Md., Mr. Hayes received his degree in engineering from Johns Hopkins university.

* * *

John F. Collins has been named personnel administrator at Armour Research Foundation of Illinois Institute of Technology, Chicago.

Promotion of Collins from personnel associate to administrator was announced by Dr. E. H. Schulz, ARF assistant director.

Schulz also announced that the personnel department has been transferred to research operations since the bulk of its services is for research departments. However, the department will continue to provide personnel services to all parts of the Foundation.

Collins joined ARF in 1949 as administrative assistant in the chemistry and chemical engineering research department. He was named personnel associate in 1953.

He received his B.S. degree in chemistry from the University of Illinois in 1949 and his M.S. degree in business and engineering administration from Illinois Tech in 1957.

* * *

Five instructors have been named to the staff of Illinois Institute of Technology, Chicago, effective Sept. 1.

They are Ching-Wen Lee, mechanics; Dr. John W. Neuberger, mathematics; Petros N. Papas, electrical engineering; Dr. Robert J. Romagnoli, physics, and Dr. Swaminatha Sundaram, physics.

Lee taught in a number of universities and high school in China and was an engineer there before coming to this country.

He received his bachelor's degree in mechanical engineering from the Chinese National Institute of Technology and his master's degree in mechanics from Illinois Tech. An IIT graduate assistant, at present he is working toward a Ph.D.

Neuberger taught two years at the University of Texas before coming to IIT. He was an engineer for Convair and also did research in the Austin, Tex., military physics laboratory.

Receiving his bachelor's and Ph.D. degrees from the University of Texas in mathematics, he also did advanced study in physics.

Papas, a graduate assistant at IIT, has been a field engineer for the General Electric Co. and an electrical engineer for the Link-Belt Co.

He received both his bachelor's and master's degrees in electrical engineering from Illinois Tech, and has done advanced study in physics and mathematics. At IIT he was the recipient of the freshmen competitive scholarship and the John Morse Memorial scholarship.

Romagnoli, a graduate assistant at IIT, received his bachelor's, master's, and Ph.D. in physics from Illinois Tech. He has done advanced study in physics and mathematics.

Sundaram has been a physics lecturer at Annamalai University in India and has published numerous physics articles.

He received his bachelor's, master's, and Ph.D. degrees in physics from Annamalai University, where he also did advanced study in mathematics and chemistry.

* * *

Walter Taylor has been appointed ceramic engineer at the Thomas Works, Delta-Star Electric Division, H. K. Porter Company, Inc.

Taylor was formerly connected with Lapp Insulator Company. Previous to joining Lapp, he was employed at the Post Engineers office, Mitchel Air Force Base, Long Island, N. Y.

* * *

Howard T. Betz has been promoted to senior scientist at Armour Research Foundation of Illinois Institute of Technology, Chicago.

Betz was advanced from supervisor of the light and optics section in the

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physics research department to one of the top scientific positions at the Foundation, according to Dr. Leonard Reiffel, department manager.

The position of senior scientist is awarded to scientists who have made outstanding technical contributions in their fields of research, Reiffel explained. Senior scientists are relieved of administrative details to devote all of their time to research.

Betz joined ARF in 1939 as a physicist and was promoted to supervisor in 1950. Prior to coming to the Foundation, he was an instructor at Valparaiso University for five years.

A graduate of Valparaiso University, he received his bachelor of arts degree in 1933 and has done graduate work at the University of Chicago.

* * *

The appointment of Professor Burgess H. Jennings, Evanston, Ill., as director of research for the American Society of Heating and Air-Conditioning Engineers is announced by ASHAE President P. B. Gordon, New York, N. Y.

The Council of the Society approved this appointment during the ASHAE Semi-Annual Meeting at Murray Bay, P. Q., Canada.

Professor Jennings was to assume his new responsibilities about the middle of August, directing operations of the Society research program both at the ASHAE Research Laboratory, Cleveland, Ohio, and at cooperating institutions.

Since 1942 Professor Jennings has been chairman of the Department of Mechanical Engineering, The Technological Institute, Northwestern University, an appointment he has resigned to become the ASHAE Director of Research. He has been actively engaged in education for over 30 years, serving on the staff of Lehigh University from 1926 to 1940, obtaining the rank of associate professor and serving as director of the Mechanical Engineering Laboratories. Professor Jennings received his appointment as professor of mechanical engineering at Northwestern University in 1940.

He has been an active consultant from early in his professional career.

Because of his activity in research work, Professor Jennings has pursued many interests in the fields of thermodynamics, psychrometry, human engineering, fluid flow, gas turbines and compressors, ventilation and air conditioning, and atomic energy.

He is the author of some 25 research papers and articles and he currently has several additional papers in preparation. The new ASHAE director of research has also found time for editorial activities in his field. He prepared the refrigeration section for the well-known Kent Handbook, and was editor-in-chief of the ASRE Data Book 1949 and 1951 editions. He was founder, and editor of the magazine *Lubrication Engineering* from 1944 to 1950.

Past president of the American Society of Refrigerating Engineers, Professor Jennings has served that Society on many committees and in other capacities. A member of the American Society of Heating and Air-Conditioning Engineers since 1942, he has served with the Guide Publication Committee 1947-48 and 1950-51 and chairman in 1952. He has also served on various technical advisory committees, the Research Executive Committee, the Research Long-Range Planning Committee, and as chairman of the Committee on Research.

Professor Jennings holds three degrees: Bachelor of Engineering, Johns Hopkins University, 1925; M.S., Lehigh University, 1928; M.A., Lehigh University, 1935.

Professor Jennings is a member of Tau Beta Pi, Pi Tau Sigma, Sigma Xi, and was awarded the Richards Memorial Award of Pi Tau Sigma in 1950 as "the most outstanding mechanical engineer within 25 years after graduation."

He is listed in Who's Who in America, Who's Who in Engineering, Who's Who in the Midwest and American Men of Science and is a registered professional engineer in Illinois and Pennsylvania.

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Corrosion Engineers To Meet Oct. 1-4

A four-paper symposium on water treating will be one of eight to be given during the Oct. 1-4 meeting of North Central Region, National Association of Corrosion Engineers. Technical and business sessions will be held at Chicago's Sherman Hotel.

First day of the meeting will be devoted to NACE technical Committees. Symposia, in addition to the one on water treatment, will be on protective coatings, pipe lines, cathodic protection, transportation, chemical processing industry, refineries and public utilities. There also will be a roundtable discussion of cathodic protection and three educational lectures.

The meeting, open to all persons interested in corrosion whether NACE members or not, is one of four being held this fall by NACE regions.

WSE Applications

In accordance with Article I, Section 5 of the By-Laws of the Western Society of Engineers, there is published below a list of applicants for admission received since the last issue of the MIDWEST ENGINEER magazine.

Orville N. Holland, Design Engineer, International Harvester Co., mail: 4939 Wabansia Av.

Andrew A. Arentz, Jr., Ass't Ch. Survey Bridge Eng. Div., Chicago Dist. Corp of Engineers, U.S. Army, 475 Merchandise Mart.

James E. McClellan, Vice Pres., Mehring & Hanson Co., 162 N. Clinton St.

George A. Wyatt, Mech. Engineer, Mehring & Hanson Co., 162 N. Clinton St.

Edmond A. Subert, Jr., Engr. Coordinator, John F. Meissner Engrs., Inc., 300 W. Washington St.

Lauren R. Asplund, Assist. Engr., Illinois Bell Telephone Co., 208 W. Washington St.

Laurence A. Framburg, Production Engr., H. A. Framburg & Co., 3220 W. Carroll Ave.

Martin A. Novy, Midwest Prod. Prom. Engr., Owens-Illinois (Kimble), 20 N. Wacker Drive.

Richard L. Durgin, Chief Dev. Engr., Illinois Gear & Machine Co., 2108 N. Natchez Ave.

Robert G. Wulff, Speaker, Writer & Engr. 1426 Heinman Ave., Evanston, Ill.

Chemical Exposition Set for Sept., 1958

The 10th National Chemical Exposition, sponsored by the Chicago Section of the American Chemical Society, will be held in the International Amphitheater in Chicago Sept. 9-12, 1958. Robert J. Reinarts, chairman of the Exposition, has announced completion of arrangements to have the big chemical show during the same week as the 134th national meeting of the Chemical Society in Chicago.

The major portion of the Exposition will be housed in the air-conditioned main building of the Amphitheater, with some displays in the new exhibit hall area. Ample parking space is available on the adjoining grounds, and special chartered busses will be provided to carry ACS registrants between the meeting rooms and the hall.

The concurrence of the two events will make Chicago the temporary capital of the chemical world. Every one, from research through development, production, engineering, and marketing, will find the combination of technical sessions and live exhibits an unusual opportunity to bring himself up to date on the newest ideas and equipment in all phases of the industry.

A working Committee has been appointed to plan the various features of the Exposition, including the famous Trail Blazers, Art, Photographic, and other special exhibits.

Support of Research, Upping Manpower, Are Pressing Needs

Two of the most critical needs facing the nation today are for increased support of basic research in the public benefit and for imaginative solutions to the shortage of scientific manpower.

Dr. Charles N. Kimball, president of Midwest Research Institute, on May 20 announced a unique plan of action to help solve both problems. He made the announcement in his annual report to

"The major resource of a research institute is the diversified skills found in its technical teams," Dr. Kimball said. "Basic problems can be solved most effectively by this organized team approach. MRI has recently launched a Basic Research Associates program, whereby industry can assist and support the Institute's research staff in expanding and intensifying basic research projects of a public benefit nature. We also have conceived a second program, of Sabbatical Fellowships, whereby selected university professors will be added to the MRI technical teams undertaking basic research."

Midwest Research Institute has been conducting extensive basic research throughout its 12-year history, Dr. Kimball explained. The Basic Research Associates program provides a unique way for various corporate and foundation managements jointly to support specific selected public benefit studies.

Work is underway on such projects as the development of an artificial heart and lung to facilitate heart surgery; the search for anti-cancer drugs; the application of specialized obstetrical research instruments recently developed at MRI; and research into new applications for known chemical compounds.

Under the Sabbatical Fellowship program, selected teachers would spend their sabbatical leaves (every seventh year) doing basic research at MRI. Thus they would become better acquainted with the non-academic point of view. This should broaden their professional horizons and make them better equipped for teaching modern science. Dr. Kimball revealed that he had written to the presidents of 52 universities throughout the country and had received practically unanimous endorsement of the program.

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Metals Division Will Meet in Chicago Nov. 6

The Metals Division of Special Libraries Association will be in session during the Second World Metallurgical Congress to be held in Chicago Nov. 6, 7 and 8, 1957. A library display booth and information center will be available at the International Ampitheater.

Speakers from England, France, and Germany as well as from the United States and Canada will be on the program.

Tours have been arranged through Armour Research Foundation Laboratories, International Harvester's New Research Center, The John Crerar Library, the largest technical library in the world, and several other research organizations in the Chicago area.

The Committee has arranged a program that should be of interest to all Metallurgists attending the World Metallurgical Congress.

Radio Remains Important in Canada

Despite Canadian interest in television, more radio receivers than ever are now being used in the Dominion, it was reported in Montreal on June 28 during the Summer General Meeting of the American Institute of Electrical Engineers.

"Today, Canadians accept radio as a public service which is taken for granted along with hydro electric power and the telephone," N. R. Olding, of the Canadian Broadcasting Corp., Montreal, said in a paper, "The Canadian Broadcasting Corporation's Radio Service in Canada." "In spite of the public interest in television, those engaged in both services know that more Canadians own and operate more radio receivers in 1957 than ever before. Data recently released by the Radio Electronic Television Manufacturers Association of Canada shows that Canadians purchased more than 1,300,000 radio receiving sets in the past two years."

Canadian radio is unique in that it is both publicly and privately owned, and many of the relay stations in remote parts of the country are automatic or semi-automatic and are push-button operated, Olding observed.

Transmitters when designed for operation by remote control, and when housed in a building designed to permit this type of operation, "can provide service equal in all essential respects to similar attended units," he said, while 20 watt unattended or semi-attended transmitters can provide useful radio service in remote areas. Both types of transmitters can reduce technical manpower requirements and operating costs, to offset cost of providing service in remote areas, and the loss of listening audience to TV in the evening.

Sharp Shooters

Connecticut Light and Power Company has equipped its line crews with weapons resembling sawed-off shotguns, states *Electrical World*. The guns actually are Coast Guard line throwers which the company found highly useful during past flood emergencies. They shoot light nylon lines across swollen rivers, enabling men to pull across heavy cables. This sets the stage for obtaining many needed items during a storm.

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Obituaries

The Western Society of Engineers has recently been notified of the following deaths:

The Western Society learned recently of the death of Member Ernest L. Abramson. Mr. Abramson had spent nearly thirty years working on the design and development of turbine pumps. His most recent association was with the Aurora Pump Company where he was Chief Engineer.

Mr. Abramson passed away on November 9, 1956.

* * *

Arthur W. Howson, Life Member of The Western Society of Engineers, passed away on June 3, 1957. During his years of membership in the Society, Mr. Howson had identified himself with many of its activities—notably the Program and Fellowship committees of which he was Vice-Chairman. He also served as a Trustee on The Western Society's Board of Direction.

Mr. Howson was well known in the engineering profession being a partner in the firm of Alvord, Burdick & Howson, consulting engineers. He was a civil engineering graduate of the University of Illinois in 1918. Immediately after graduation he entered the armed forces as a lieutenant of engineers where he served until the end of the war. Upon his return to civilian life, Mr. Howson was employed by the Illinois Central Railroad with whom he was associated until 1940. During this period he was active in the 108th Engineers of the 33rd Division, Illinois National Guard, where he rose from lieutenant to colonel of the regiment.

With the beginning of World War II, Mr. Howson was recalled to active duty, serving first in the training of engineering troops on Hawaii followed by airfield construction on Saipan. From the summer of 1945 until May 1946 he was in charge of the clearing of the harbor of Naha, Okinawa.

In 1946, Mr. Howson again returned to civilian life where he entered the firm of Alvord, Burdick & Howson. Mr. Howson was active in the Illinois Section of A.S.C.E., supervised water works construction at Richland Washington housing project for the Atomic Energy Commission, and was associated with many other important water and sanitary projects.

Mr. Howson's passing is a loss both to The Western Society of Engineers and the profession itself. The Western Society extends its sincere sympathy to his family.

Computers May Solve Air Traffic Problems

Traffic jams in the sky are more than just a possibility—they are an actuality.

But, electronic computers may provide a solution to the problem.

Scientists at Armour Research Foundation of Illinois Institute of Technology are simulating the flow of air traffic on an electronic digital computer.

They are investigating air traffic control systems for use by commercial, private, and military operators in the common system of the continental United States, according to Virgil H. Disney, manager of the ARF electrical engineering research department.

Purpose of the investigation is to determine the effect of changes in the route structure and rules of the control system on air traffic capacity, he explained.

Sponsored by the U.S. Army Signal Engineering Laboratories, Ft. Monmouth, N.J., and the Air Navigation Development Board, Washington, D.C., the research study is being conducted in the Foundation's computer center in Chicago and its Southwestern Laboratories in Tucson, Ariz.

It is now widely recognized that an improved systems approach to air traffic problems is necessary, it was pointed out by project leader Gayle W. Bond of the ARF staff at Tucson.

"During the past decade, volume of air traffic has increased very rapidly and flight characteristics of aircraft have changed almost radically," he said.

"The maximum handling capacity is being reached," he added, "and new techniques for air traffic control are needed to handle more aircraft in the same amount of space with an adequate margin of safety."

A number of research and development projects aimed at improving the common system of air traffic and navigation in the United States are being sponsored by the Air Navigation Development Board, composed of the Department of Defense, Commerce, and the Military Departments.

For purposes of the Foundation's investigation, the area surrounding New York, Washington, and in between has been selected.

"The initial portion of the program has been concerned with stipulated improvements in the present air traffic control system which can be made with presently available means," explained Bond.

He cited such improvements as alteration of airway structure, rearrangement of navigation and communication facilities, revised procedure, and additional personnel.

The later portion of the program is concerned with system improvements resulting from the assumed use of facilities which normally might be expected or could be made available in 1965, such as a complete radar network in the United States.

Currently, two simulation methods are being investigated—one using paper and pencil methods and the other using electronic digital computers.

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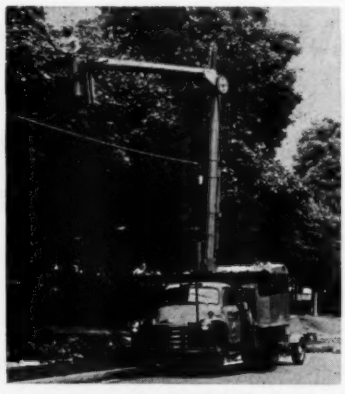

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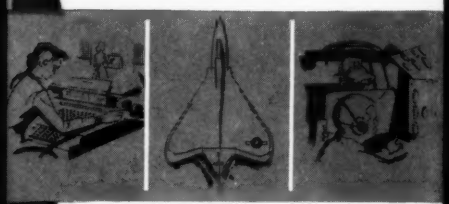

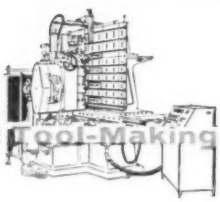

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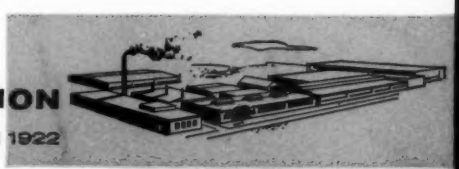

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